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Spanish Research Report for 2001

by

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SUBAREA 3

A. Status of the Fisheries

The Spanish fleet fishing in NAFO Regulatory Area includes two components: the pair-trawlers, formerly fishing for cod and currently fishing for Greenland halibut, and the trawlers.

· Pair – trawler fleet.

In 2001 the activity of this fleet was very limited as only two pair-trawler was fishing for Greenland halibut in Div. 3LM between April and June. One scientific observer was on board one of these pair-trawlers. Record of catches by species, effort, position of each haul, and biological sampling on the most important species in the catch (Greenland halibut, by-catch and discard species) were obtained. Biological sampling including recording weight at length, sex ratio, maturity stages, otoliths, and collecting material for reproductive studies were carried out on Greenland halibut and roughhead grenadier by the scientific observer. The length compositions of the Greenland halibut, roughhead grenadier, and redfish pair-trawler catches are presented in Tables 1 to 3, respectively. The age composition, mean lengths and mean weights at age of the Greenland halibut and roughhead grenadier pair-trawler catch are presented in Tables 4 and 5, respectively. The Greenland halibut catches are based mainly on ages 5 to 7 and those of roughhead grenadier on ages 6 to 10.

· Trawler fleet.

In 2001 a total of 31 trawlers have been involved in NAFO fisheries. The main fishery in NAFO area is the Greenland halibut fishery (mainly in Div. 3LM), alternating with the skate fishery in the second half of the year (Div. 3N), shrimp fishery (Div. 3M), and redfish fishery (Div. 3O). The total fishing effort of this fleet reported by the NAFO observers on board every vessel (Table 6) have been used to estimate the effort proportion directed to each one of those target species. Most part of the effort concentrates in Div. 3LM, corresponding to the northern Flemish pass fishing area. While in this area it remains almost constant over the year, a remarkable increase in effort occurred in Div. 3NO since late summer and in autumn.

The breakdown of the effort by depth and Division is presented in Table 7. In Div. 3L the fishing activity has been performed at depths beyond 600 m, indicating the fleet was targeting Greenland halibut. In Div. 3M most of the effort was carried out in the stratum of more than 600 meters depth, targeting Greenland halibut. The effort carried out, in this Division, in the stratum from 200 to 600 meters depth belongs to the shrimp fishery. In Div. 3N during the first

half of the year, the fishing activity has been performed at depths beyond 600 m, indicating the fleet was targeting Greenland halibut, but since July part of the fleet activity moved to depths less than 200 m, where the skate fishery is performed. Fishing activity in Div. 3O was limited and targeting redfish. The fishing activity in the area 1F were directed to the fishery of *Sebastes mentella*.

In addition to the NAFO observers, 7 scientific observers from the Spanish sampling program were on board this fleet. Besides recording catches, discards and effort, those observers carried out biological sampling on Greenland halibut, thorny skate and the respective main by-catch species. This includes recording weight at length, sex-ratio, maturity stages and stomach analysis, and collecting material for reproductive studies on Greenland halibut and roughhead grenadier. Otoliths of those two species are also taken for age determination.

Division 3LM

In these Divisions, the most important specie in the catches is Greenland halibut and practically all is captured in the stratum of more than 600 meters depth. The main species in the by catch of this fishery are the grenadiers (RNG and RHG), *Gaidopsarus ensis* (HKR) and skates (SKA). In the Div. 3M, besides the Greenland halibut fishery, exists a shrimp fishery that it is carried out mainly in the stratum of 200-600 meters.

Division 3NO

In the Div. 3N, most of the effort is carried out in the strata of <200 and >600 meters. In the stratum of <200 skate fishery is carried out in the second semester of the year and the main species of the by catch of this fishery are American plaice (PLA) and Yellowtail flounder (YEL). In the stratum of >600, the main specie in the catches is the Greenland halibut and the main species that compose the by-catch are the American plaice (PLA), grenadiers (RNG) and skate (SKA).

In the Div. 3O the effort carried out by the Spanish fleet is very little and most of its is carried out in the stratum of 200-600 meters. The main specie in the catches is the redfish (RED), and the main species in the by-catch of this fishery are American plaice (PLA), yellowtail flounder (YEL) and skate (SKA).

In Table 19 the percentage of the catches is shown by stratum of depth for each species and Division and Fig. 1 shows the percentages of the catches for species and division.

The length composition of the Greenland halibut, roughhead grenadier and witch flounder in the trawl catches for the months with sampling are presented in Tables 8 to 10 respectively. Those length distributions belong to the retained plus discarded catch. The parameters of the species length-weight relationships used are shown in Table 11. The age composition of the Greenland halibut and roughhead grenadier trawl catches are presented in Tables 12 and 13, respectively. Most part of the Greenland halibut catches are from ages 5 to 7 and the main part of the roughhead ones between 6 to 10. The length distributions of the American plaice, yellowtail flounder, cod and skate taken (retained catch plus discards) are presented in Tables 14 to 17 respectively. The redfish length composition in the trawl catches is presented in Table 18.

(B) Research Studies

In May 2001, a bottom trawl survey have been conducted in Div. 3NO Regulatory Area. A total of 133 hauls using a Pedreira gear with a stratified design have been performed, to a depth of 1450 meters. 92 of them have been made fishing in parallel with the R/V *Vizconde de Eza* using a Campelen gear, which replace this year the C/V *Playa de Mendiña* in the performed of the bottom trawl. So, a comparative study has been developed to transform the historical series of the C/V *Playa de Mendiña* (1995-2000) in the new series of the R/V *Vizconde de Eza*. The results of that comparative study are presented in SCR 02/5. In addition, 18 of the 92 hauls have been made in parallel with the Canadian Research Vessel *Wilfred Templeman*, using also a Campelen gear. The results of the Spanish 3NO bottom trawl survey for all the period studied (1995-2001), including abundance and biomass indices and length distributions of American plaice (SCR 02/2), yellowtail flounder (SCR 02/3) and Greenland halibut (SCR 02/4) are presented in SCR 02/2, SCR 02/3, and SCR 02/04, respectively.

The EU bottom trawl survey on Flemish Cap (Div. 3M) was carried out in July 2001. A total of 120 valid hauls with the usual survey gear (Lofoten) were made up to 730 meters depth. Additionally, 20 hauls were made with a Campelen gear for catchability comparisons. Survey results including abundance indices of the main commercial species and age distributions for cod, redfish, American plaice and Greenland halibut are presented in the SCR 02/12, and for roughhead grenadier in SCR 02/18. Data on shrimp from this survey was presented in SCR 01/172 and SCR 01/189. The results regarding the hydrographic conditions during the survey are presented in SCR 02/... Feeding studies on the main species were continued, and samples for histological assessment of sexual maturity of cod, redfish, Greenland halibut and roughhead grenadier have been also taken.

REFERENCES

- González, D.; Paz, X. and Román, E. (2002).- Abundance, Biomass and Population Structure for American Plaice from the Survey Conducted by Spain in the NAFO Regulatory Area of Divisions 3NO, 1995-2001. *NAFO SCR Doc. 02/2*. Serial No. 4600
- Paz, X.; González, D. and Román, E. (2002).- Yellowtail Flounder Data from the Survey Conducted by Spain in the NAFO Regulatory Area of Divisions 3NO, 1995-2001. *NAFO SCR Doc. 02/3*. Serial No. 4601
- González, D.; Román, E. and Paz, X. (2002).- Results for the Greenland Halibut in the Spanish Survey in the NAFO Regulatory Area of Divisions 3NO, 1995-2001: Abundance, Biomass and Population Structure. *NAFO SCR Doc. 02/4*. Serial No. 4602
- D. González Troncoso, Esther Román and X. Paz. Comparative Exercise of Efficiency Between C/V Playa de Menguña and R/V Vizconde de Eza in the NAFO Divisions 3NO in May 2001. *NAFO SCR Doc. 02/5*. Serial No. 4603
- Vázquez, A. (2002). Results from Bottom Trawl Survey on Flemish Cap of July 2001. *NAFO SCR Doc. 02/12*. Serial No. 4613
- Murua, H. (2002). A Review on Roughhead Grenadier (*Macrourus berglax*) Biology and Population Structure. *NAFO SCR Doc. 02/18*. Serial No. 4619
- Díaz, P. (2001). Northern Shrimp (*Pandalus borealis*) on Flemish Cap in July 2001. *NAFO SCR Doc. 01/172*. Serial No. 4517.
- Skuladottir, U. And Díaz, P. (2001). Age Assessment of Northern Shrimp (*Pandalus borealis*) in EU Surveys on Flemish Cap in 1988-2001. *NAFO SCR Doc. 01/189*. Serial No. 4579.

TABLE 1. Greenland halibut length composition of the Spanish pair-trawlers catch.

Div. 3L			Div. 3M	
Length (cm)	May	Total	May	Total
32 - 33	5	5		
34 - 35	19	19	5	5
36 - 37	41	41	13	13
38 - 39	64	64	43	43
40 - 41	134	134	111	111
42 - 43	174	174	169	169
44 - 45	185	185	194	194
46 - 47	164	164	181	181
48 - 49	110	110	133	133
50 - 51	53	53	69	69
52 - 53	25	25	38	38
54 - 55	11	11	24	24
56 - 57	7	7	8	8
58 - 59	4	4	5	5
60 - 61	1	1	4	4
62 - 63	1	1	1	1
64 - 65	1	1	1	1
68 - 69	1	1		
72 - 73	1	1		
Total	1000	1000	1000	1000
No Fish measured	1432	1432	2237	2237
No samples	11	11	17	17
Sampled weight (Kg)	1086	1086	1828	1828

TABLE 2. Roughhead grenadier length composition of the Spanish pair-trawlers catch.

3L			3M	
Length (cm)	May	Total	May	Total
10 - 11	9	9	5	5
11,5 - 12,5	41	41	15	15
13 - 14	166	166	155	155
14,5 - 15,5	313	313	199	199
16 - 17	235	235	277	277
17,5 - 18,5	115	115	218	218
19 - 20	78	78	87	87
20,5 - 21,5	23	23	39	39
22 - 23	5	5	5	5
23,5 - 24,,5	9	9	0	0
25 - 26	0	0	0	0
26,5 - 27,5	5	5	0	0
Total	1000	1000	1000	1000
Fish measured	217	217	206	206
Nº of samples	2	2	2	2
Sample weight (Kg.)	92	92	94	94

TABLE 3. Redfish length composition of the Spanish pair-trawlers catch.

Div 3L			Div. 3M	
Length (cm)	May	Total	May	Total
22 - 23			5	5
24 - 25	8	8	45	45
26 - 27	49	49	241	241
28 - 29	172	172	355	355
30 - 31	279	279	248	248
32 - 33	270	270	61	61
34 - 35	123	123	31	31
36 - 37	82	82	9	9
38 - 39	8	8	5	5
40 - 41	8	8		
Total	1000	1000	1000	1000
Fish measured	122	122	423	423
Nº of samples	1	1	4	4
Sampled weight (Kg.)	55	55	145	145

TABLE 4. Greenland halibut age composition, mean length (M. L. – cm) and mean weight (M. W. – Kg.) at age in the Spanish pair-trawlers catch.

Age	3L			3M		
	M. L.	M. W.		M. L.	M. W.	
3	5	35	0,3	1	37	0,4
4	37	37	0,4	14	38	0,4
5	156	40	0,5	114	41	0,5
6	425	44	0,7	423	45	0,7
7	302	47	0,8	347	48	0,9
8	65	50	1,0	86	51	1,1
9	6	57	1,5	9	57	1,5
10	2	60	1,8	4	61	1,8
11	1	65	2,2	2	63	2,0
12	1	69	2,6	1	64	2,1
13	1	72	3,0	0		
	1000			1000		

TABLE 5. Roughhead grenadier age composition, mean length (cm) and mean weight (g) at age in the Spanish pair-trawlers catch.

Division 3L				Division 3M			
EDAD	TOTAL	M. Length (cm)	M. Weight (g)	EDAD	TOTAL	M. Length (cm)	M. Weight (g)
2	0	0,0	0	2	0	0,0	0
3	3	10,1	108	3	1	10,5	122
4	12	11,1	145	4	4	10,6	124
5	48	12,6	205	5	28	13,1	232
6	149	13,8	266	6	128	13,8	264
7	194	15,0	339	7	149	15,0	336
8	235	15,7	389	8	216	16,1	415
9	193	17,1	491	9	249	17,3	513
10	87	18,3	598	10	142	18,2	585
11	37	19,9	757	11	43	19,3	690
12	22	20,0	768	12	31	19,9	758
13	10	21,9	998	13	5	20,7	843
14	8	24,2	1315	14	3	20,9	863
15	2	25,2	1489	15	0	0,0	0
16	1	25,3	1522	16	1	22,5	1063
17	0	26,5	1693	17			
Fish measured		1000		Fish measured		1000	
Nº of samples		2		Nº of samples		2	
Sampled weight (Kg.)		425,4		Sampled weight (Kg.)		452,7	

TABLE 6. Fishing effort (hours fishing) of the Spanish trawler fleet in NAFO Regulatory Area in 2000, proportion of effort by Division and proportion directed to the main target species (Greenland halibut-GHL, skate-RJR and prawn-PRA).

	J	F	M	A	MY	J	JL	AG	S	O	N	D	TOTAL	% by Div.	% GHL *	% RJR **	% PRA ***
1F	0	0	0	0	0	0	0	52	23	0	0	0	75	0	-	-	-
3L	2255	1797	2313	3806	2763	2840	3292	2562	3350	3173	6391	7847	42389	46	100	0	0
3M	1595	1761	2841	2637	3517	2684	1396	1156	901	2002	2691	2006	25187	27	88	0	12
3N	71	559	1087	1436	2727	1793	2010	2283	1342	4711	2491	1986	22496	24	79	21	0
3O	0	68	280	135	119	172	224	205	21	159	109	354	1846	2	91	9	0
TOTAL	3921	4185	6521	8014	9126	7489	6922	6258	5637	10045	11682	12193	91993				

* % of the total hours targeting GHL in the Div. (Identified by mesh size = 130 mm and fishing depth > 600 m)

** % of the total hours targeting RJR in the Div. (Identified by mesh size >200 mm and fishing depth < 200 m)

*** % of the total hours targeting PRA in the Div. (Identified by mesh size <80 mm and fishing depth between 200 and 600 m)

TABLE 7. Breakdown (%) of the Spanish trawler fleet total fishing effort by depth intervals (in meters) and by Division in 2001.

	1F			3L			3M			3N			3O		
Month	<200	200-600	>600	<200	200-600	>600	<200	200-600	>600	<200	200-600	>600	<200	200-600	>600
1				0	3	97	1	4	96	0	0	100			
2				0	1	99	0	3	97	0	0	100	0	33	67
3				0	0	100	0	10	90	0	1	99	0	14	86
4				0	0	100	0	8	92	0	3	97	2	70	28
5				0	1	99	0	12	88	5	1	94	14	41	45
6				0	0	100	0	28	72	6	1	93	5	23	72
7				0	1	99	1	13	87	25	11	63	31	14	55
8	0	100	0	0	1	99	0	42	58	27	15	58	32	55	13
9	0	100	0	0	0	100	1	17	82	28	4	68	40	34	26
10				0	2	98	0	36	63	63	7	30	8	92	0
11				1	3	96	3	28	69	41	8	51	4	78	18
12				0	10	89	0	8	92	16	1	83	37	6	57
Total	0	100	0	0	3	97	0	17	83	27	6	68	17	35	48

TABLE 8a. Greenland halibut length composition (0/00) in the trawl catches in Div. 3L, 2001

Length (cm)	Div. 3L											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Oct	Nov	Dec	Total
22-23						0						0
24-25					1	3						1
26-27	0				2	8						2
28-29	1		0		1	6			1		1	1
30-31	3	2	0		4	11	3		1		2	4
32-33	6	3	1	2	8	21	13		3	1	4	7
34-35	11	12	8	10	25	42	21		14	1	13	17
36-37	37	22	14	25	46	61	31	14	30	9	44	35
38-39	80	49	38	60	84	87	52	24	32	22	86	67
40-41	133	93	70	113	126	127	95	70	65	58	115	109
42-43	153	134	111	164	151	150	122	80	111	83	133	137
44-45	193	178	164	172	164	147	186	140	141	139	136	166
46-47	165	188	183	168	148	124	177	225	149	153	137	158
48-49	114	145	152	129	111	92	126	191	133	177	116	124
50-51	59	82	107	71	63	49	70	104	120	118	76	73
52-53	22	33	57	42	29	28	38	38	68	88	45	38
54-55	9	20	35	20	14	15	23	24	50	46	28	21
56-57	5	12	22	10	5	9	11	30	30	23	17	12
58-59	3	9	12	4	6	6	13	18	9	25	11	9
60-61	2	7	8	2	4	4	5	16	10	13	11	6
62-63	1	3	6	2	3	2	4	7	5	10	7	4
64-65	0	3	4	2	1	2	1	3	6	4	5	2
66-67	1	2	2	1	1	1	4	7	1	7	4	2
68-69	0	1	1	3	1	1		3	1	3	1	1
70-71	0	0	1	1	1	1	1			3	2	1
72-73	0	0	0		0	1	0		1	2	1	1
74-75		0	1	0	0	1	0	3	3	4	1	1
76-77			0			0	1		2	3	1	0
78-79		0	1		0	0	1		3	1	1	0
80-81		0				0			7	1		0
82-83		0	0		0	0		3	3	2	0	0
84-85		0			0	0	2			2	0	0
86-87		0					0			1		0
88-89		0				0						0
90-91												
92-93									2			0
94-95												
96-97												
98-99						0						0
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No Fish measured	4492	2646	4126	2526	3034	5084	1407	401	691	2522	3725	30654
No samples	22	14	19	12	14	24	7	2	5	19	20	158
Sample weight (Kg)	3265	2153	3602	1970	2236	3583	1133	369	652	2514	3038	24139

TABLE 8b. Greenland halibut length composition (0/00) in the trawl catches in Div. 3M, 2001.

Length (cm)	Div. 3M										
	Jan	Feb	Mar	Apr	May	Jul	Aug	Oct	Nov	Dec	Total
32-33	5	2	4		1				1		1
34-35	9	17	5	1	4	5	5		1	1	3
36-37	9	33	18	10	17	10	15	2	5	5	9
38-39	42	58	54	31	36	15	40	8	20	17	27
40-41	90	111	116	74	88	45	70	44	48	44	63
42-43	175	165	179	94	152	65	120	82	98	81	110
44-45	208	196	214	158	198	120	216	152	141	124	154
46-47	179	173	189	210	213	200	216	248	176	162	181
48-49	113	115	132	169	128	190	140	214	173	183	164
50-51	52	52	51	93	64	105	70	138	134	144	112
52-53	28	30	21	44	33	65	30	71	77	95	66
54-55	38	20	7	25	21	35	25	19	43	52	37
56-57	14	5	5	17	14	35	10	4	25	33	23
58-59	19	11	3	15	12	30	15	2	14	15	13
60-61	5	4	1	17	5	20	5		9	12	9
62-63	5	2		3	4	15	5		9	8	6
64-65	5	2		5	3	5	10		5	6	4
66-67		2		11	1	5			5	3	4
68-69				8	3		5		3	3	3
70-71		2	2	3	1	15			4	1	3
72-73				9					2	3	2
74-75				1		5		7	2	2	2
76-77				3				7	2	1	1
78-79	5				1	5			1	1	1
80-81						5			1	1	1
82-83									1	1	1
84-85									0	1	0
86-87						5			0	0	0
88-89										0	0
90-91									1	0	0
92-93											
94-95											
96-97											
98-99									0		0
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No Fish measured	212	480	842	607	1225	200	199	296	3877	3030	10968
No samples	1	2	4	3	6	1	1	2	22	16	58
Sample weight (Kg)	174	367	627	565	999	210	166	267	3753	2987	10106

TABLE 8c. Greenland halibut length composition (0/00) in the trawl catches in Div. 3N, 2001.

Length (cm)	Div. 3N								
	Feb	Apr	May	Jun	Jul	Oct	Nov	Dec	Total
22-23						0			0
24-25		1	1	0		1			1
26-27				1		4	2	5	2
28-29			0	1		5	15	15	3
30-31	2		3	3		13	19		6
32-33	9	3	12	14	15	16	11	10	12
34-35	8	10	19	22	40	25	22	29	20
36-37	24	28	41	36	50	55	50	15	40
38-39	72	69	61	60	70	72	73	59	66
40-41	129	148	111	101	124	128	103	74	118
42-43	199	195	151	132	174	156	130	103	155
44-45	178	165	187	170	204	157	146	127	167
46-47	172	155	153	155	109	120	136	127	143
48-49	89	100	101	129	85	94	94	137	105
50-51	50	59	63	70	45	67	80	123	68
52-53	23	29	35	30	30	34	59	78	36
54-55	11	17	17	25	25	20	26	20	20
56-57	12	5	13	16	20	10	13	39	13
58-59	6	7	9	14	10	5	3	25	9
60-61	5	3	6	7		4	7	5	5
62-63	6	2	3	4		1	4		3
64-65	4	1	3	2		4			2
66-67	1	1	2	3		0	4		1
68-69			1	1		3	2		1
70-71			1	1		1			1
72-73			1	1		0			0
74-75			0	1		1		5	1
76-77			1	0					0
78-79			0			0			0
80-81			1	1		0		5	1
82-83			0	0		0			0
84-85									
86-87						0			0
88-89						0			0
90-91						0			0
92-93									
94-95				0					0
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000
No Fish measured	641	874	2324	1879	201	2253	464	204	8840
No samples	3	4	11	9	1	14	4	1	47
Sample weight (Kg)	478	646	1808	1502	144	1669	351	176	6778

TABLE 8d. Greenland halibut length composition (0/00) in the trawl catches in Div. 3O, 2001.

Length (cm)	Div. 3O		
	Apr	Jun	Total
30-31	3		3
32-33	12		11
34-35	26		24
36-37	74	24	70
38-39	107	51	103
40-41	155	75	149
42-43	158	120	155
44-45	135	186	139
46-47	104	131	106
48-49	80	105	82
50-51	55	84	58
52-53	35	81	38
54-55	17	60	20
56-57	21	36	23
58-59	9	9	9
60-61	6	9	6
62-63		6	0
64-65		6	0
66-67	3		3
68-69		6	0
70-71			
72-73		6	0
74-75		6	0
Total	1000	1000	1000
No Fish measured	431	199	630
No samples	2	1	3
Sample weight (Kg)	307	180	459

TABLE 9a. Roughhead grenadier length composition (0/00) in the trawl catches in Div. 3L, 2001.

	Div. 3L											
Length (cm)	Jan	Feb.	Mar	Apr	May	Jun	Jul	Aug	Oct	Nov	Dec	Total
5.5-6.5							0	0				0
7-8	5						1		3			0
8.5-9.5	2				2	14	3			8		3
10-11	7	10	4	4	10	40	18	5	10	26	3	15
11.5-12.5	76	59	38	30	47	89	64	58	78	44	7	55
13-14	272	154	138	104	107	157	158	103	136	139	71	138
14.5-15.5	333	260	252	189	205	218	199	134	132	181	206	226
16-17	144	192	200	163	195	158	128	184	183	190	268	183
17.5-18.5	87	155	165	179	173	130	169	244	149	142	175	158
19-20	36	87	107	153	117	90	140	136	29	107	116	106
20.5-21.5	10	36	51	68	52	37	52	60	39	53	30	45
22-23	8	12	18	28	28	19	19	20	42	26	28	20
23.5-24.5		10	10	22	12	10	10	12	58	14	20	12
25-26	2	10	6	13	11	9	13	3	39	11	22	10
26.5-27.5	8	5	3	14	12	8	6	13	27	13	29	8
28-29	5	2	5	13	10	6	8	5	18	12	13	7
29.5-30.5		4	2	9	7	6	4	3	27	16	4	5
31-32	3	2	1	2	6	3	1	5		6		2
32.5-33.5		1	1	4	3	4	5	8	8	4	3	3
34-35		0	1	3	2	2	1		19	3	4	2
35.5-36.5		0	0	1	1	1		5		10		1
37-38				2		1				3		0
38.5-39.5						0	1			2		0
40-41							1					0
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	378	1722	3725	1224	2770	4290	1608	397	111	854	271	17350
N° of samples	2	9	18	6	13	21	8	2	2	8	2	91
Sample weight (Kg)	148	831	1850	770	1605	2135	871	235	81	552	168	9228

TABLE 9b. Roughhead grenadier length composition (0/00) in the trawl catches in Div. 3M, 2001.

LENGTH (cm.)	Div. 3M							Total
	Jan	Mar	Apr	May	Jun	Nov	Dec	
7-8							1	0
8.5-9.5							2	1
10-11			3	5	10	8	17	8
11.5-12.5		10	38	23	38	60	54	37
13-14		20	141	106	121	116	107	107
14.5-15.5		59	264	220	221	204	180	199
16-17		142	209	193	192	113	194	183
17.5-18.5		191	181	204	179	193	184	188
19-20		137	90	142	136	170	121	133
20.5-21.5		152	43	60	46	62	38	59
22-23		98	13	9	11	15	36	26
23.5-24.5		44	8	14	9	13	11	13
25-26		20	4	6	7	5	10	11
26.5-27.5		29	1	3	6	8	5	7
28-29		39	3	5	10	11	4	7
29.5-30.5		20	1	6	5	12	2	5
31-32		20		3	4	3	9	6
32.5-33.5		10			2		1	1
34-35		5				5	13	4
35.5-36.5		5					2	1
37-38					2		5	2
38.5-39.5						3	5	2
40-41					2			1
Total	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	204	1067	825	803	394	1342	922	5557
N° of samples	1	5	4	4	2	8	5	29
Sample weight (Kg)	188	502	443	440	233	841	733	3309

TABLE 9c. Roughhead grenadier length composition (0/00) in the trawl catches in Div. 3N, 2001.

	Div. 3N								
Length (cm)	Feb	Apr	May	Jun	Jul	Oct	Dec	Total	
5.5-6.5					0			0	
7-8					1		10	1	
8.5-9.5			4		4		6	3	
10-11	1		16		19	5	3	5	12
11.5-12.5	28		59		55	34	25	57	45
13-14	198	44	145		147	84	132	227	143
14.5-15.5	275	167	270		262	148	262	331	258
16-17	165	239	172		178	128	199	103	180
17.5-18.5	167	201	121		117	237	98	81	134
19-20	78	185	88		85	198	64	49	94
20.5-21.5	21	73	40		42	64	29	22	40
22-23	27	39	21		21	24	25	35	24
23.5-24.5	13	15	16		16	15	22	27	16
25-26	10	11	12		18	10	44	12	15
26.5-27.5	7	16	8		12	10	6	27	10
28-29	3	3	9		8	15	35	5	9
29.5-30.5	4	5	5		3	10	16	7	5
31-32	2	1	5		6	5	6	5	5
32.5-33.5			2		1	10	16	2	2
34-35			4		2	5		2	2
35.5-36.5			1		2				1
Total	1000	1000	1000		1000	1000	1000	1000	1000
Fish measured	707	439	1459		1670	203	226	215	4919
N° of samples	3	2	7		8	1	2	2	25
Sample weight (Kg)	344	269	775		888	134	148	113	2664

TABLE 10. Witch flounder length composition (0/00) in the trawl catches in Div. 3L, 3M, 3N and 3O in 2000.

Length (cm)	3L	3M	3N	3O
22-23	2			
24-25	3			5
26-27	6		1	26
28-29	19		1	83
30-31	37	25	10	167
32-33	48	50	33	265
34-35	100	100	93	141
36-37	142	125	167	83
38-39	177	150	233	52
40-41	145	200	148	62
42-43	121	175	123	52
44-45	67	25	56	21
46-47	45	125	49	31
48-49	33		30	11
50-51	23	25	18	
52-53	17		18	
54-55	6		12	
56-57	7		5	
58-59	1		2	
60-61			0	
Total	1000	1000	1000	1000
No Fish measured	774	40	1511	192
No samples	5	1	10	1
Sample weight (Kg)	514	27	1036	82

TABLE 11. Parameters of the species length – weight relationship.

Species	a	b
<u>Greenland halibut</u>	0.007	3.031
<i>Roughhead grenadier</i>	0.150	2.840
<i>Witch flounder</i>	0,004	3,240
<i>American plaice</i>	0.004	3.186
<i>Yellowtail flounder</i>	0.007	3.090
<i>Cod</i>	0.008	3.040
<i>Thorny skate</i>	0.011	2.947
<i>Redfish</i>	0,019	2,906

TABLE 12. Greenland halibut age composition (0/00), mean length (M.L.- cm) and mean weight (M.W. - kg) at age in the Spanish trawlers catch in 2001.

	3L			3M			3N			3O			All Divisions		
Age	M. L.	M. W.		M. L.	M. W.		M. L.	M. W.		M. L.	M. W.		M. L.	M. W.	
2	2	28	0,2	0	33	0,3	2	27	0,1	0			2	28	0,2
3	10	33	0,3	1	36	0,4	10	31	0,2	5	34	0,3	9	32	0,3
4	37	36	0,4	9	37	0,4	44	36	0,4	55	37	0,4	34	36	0,4
5	138	40	0,5	72	41	0,6	184	41	0,5	234	40	0,5	138	40	0,5
6	381	44	0,7	346	45	0,7	408	45	0,7	390	44	0,7	382	45	0,7
7	317	48	0,9	389	49	0,9	248	48	0,9	214	48	0,9	312	48	0,9
8	84	51	1,1	126	52	1,1	74	53	1,2	73	53	1,2	88	52	1,1
9	11	58	1,5	19	58	1,5	14	57	1,5	18	57	1,5	13	57	1,5
10	7	61	1,8	11	61	1,8	5	61	1,8	4	61	1,8	7	61	1,8
11	5	64	2,1	9	64	2,1	4	63	2,0	2	62	1,9	5	64	2,1
12	4	68	2,5	8	68	2,6	4	68	2,6	2	68	2,5	4	68	2,5
13	2	73	3,2	6	73	3,1	3	70	2,8	2	68	2,6	3	72	3,0
14	1	80	4,1	2	79	3,9	1	78	3,9	0	74	3,2	1	79	4,0
15	1	82	4,4	1	81	4,3	0	87	5,3	0			1	82	4,5
	1000			1000			1000			1000			1000		

TABLE 13. Roughhead grenadier age composition (0/00), mean length (M.L.- cm) and mean weight (M.W. - kg) at age in the Spanish trawlers catch in 2001.

Age	3L			3M			3N			All Divisions		
	M. L.	M.W.		M. L.	M.W.		M. L.	M.W.		M. L.	M.W.	
2	1	9	69	0	8	58	1	8	60	1	9	66
3	6	10	103	2	10	112	5	10	100	5	10	104
4	15	11	139	9	11	144	12	11	140	13	11	141
5	50	12	197	36	13	200	45	13	201	46	13	199
6	142	14	259	112	14	263	148	14	263	136	14	260
7	144	15	328	126	15	333	157	15	327	142	15	328
8	175	16	390	168	16	398	183	16	383	173	16	390
9	190	17	513	209	18	526	177	17	505	191	17	516
10	116	18	597	137	19	604	103	18	598	118	18	600
11	53	20	746	67	20	747	48	20	758	56	20	750
12	41	21	831	52	21	829	41	21	868	44	21	841
13	21	22	1042	26	22	1024	24	23	1094	23	22	1050
14	16	25	1372	18	24	1317	20	25	1389	18	25	1358
15	11	26	1656	11	26	1622	14	26	1630	11	26	1639
16	6	28	1936	7	28	1968	7	28	1968	6	28	1957
17	3	29	2141	3	29	2241	3	29	2159	3	29	2181
18	3	31	2527	3	31	2516	3	31	2508	3	31	2520
19	3	31	2718	5	32	2841	4	31	2685	4	32	2747
20	2	33	3223	3	34	3254	2	33	3168	2	33	3222
21	1	35	3626	3	36	4051	1	34	3463	2	35	3785
22	1	35	3565	1	36	3990	1	34	3442	1	35	3676
23	0	37	4347	1	38	4739	0	36	3944	1	38	4546
24	0	38	4710	1	39	4876	0			0	39	4797
	1000			1000			1000			1000		

TABLE 14a. American plaice length composition (0/00) in the trawl catches in Div. 3L in 2001.

Div. 3L							
Length (cm)	Jan	Feb	Mar	Apr	May	Dec	Total
22-23					3		1
24-25	5				7	1	4
26-27	5		3	3	20	4	11
28-29	21		18	14	40	11	25
30-31	21	15	25	39	68	31	47
32-33	83	53	34	100	124	103	107
34-35	124	137	81	173	181	134	155
36-37	161	260	157	184	203	171	185
38-39	233	244	181	176	121	156	151
40-41	135	130	145	126	96	137	118
42-43	119	92	127	89	45	108	81
44-45	57	46	84	48	43	82	59
46-47	16	23	66	25	32	37	33
48-49	16		44	9	13	21	17
50-51			19	8	4	4	5
52-53	5		7	2	0		1
54-55			4	0			0
56-57			4	2			0
58-59							
60-61							
62-63							
64-65							
66-67							
68-69				2			0
Total	1000	1000	1000	1000	1000	1000	1000
No Fish measured	193	131	402	1150	853	1079	3808
No samples	1	1	3	6	4	6	21
Sample weight (Kg)	91	61	223	533	354	522	1726

TALBE 14b.- American plaice length composition (0/00) in the trawl catches in Div. 3N and 3O in 2001.

Div. 3N											Div. 3O	
Length (cm)	Feb	Apr	May	Jun	Jul	Aug	Oct	Nov	Dec	Total	May	Total
14-15							0			0	4	4
16-17							0			0	8	8
18-19							10			5	31	31
20-21							13			6	69	69
22-23							7	4	13	5	115	115
24-25			4				19	3	33	11	65	65
26-27		1	12				13	0	38	9	34	34
28-29	7	7	31	14			10	0	23	9	19	19
30-31	19	34	87	28	19		35	2	15	27	31	31
32-33	44	80	171	93	15	5	60	31		58	65	65
34-35	97	139	193	168	29	41	65	55	25	76	92	92
36-37	132	200	187	187	39	31	85	86	38	100	84	84
38-39	167	157	134	201	78	83	137	129	36	131	76	76
40-41	203	158	81	117	122	124	105	130	103	116	76	76
42-43	133	98	44	80	190	186	78	125	71	93	76	76
44-45	100	69	32	51	200	211	97	187	60	117	53	53
46-47	48	35	17	28	166	160	91	103	97	85	34	34
48-49	28	15	7	9	63	67	59	71	138	58	27	27
50-51	12	5		14	49	31	39	34	95	34	19	19
52-53	2	1		5	15	26	28	21	84	24	15	15
54-55	1				5	16	17	10	73	15	8	8
56-57	4			5	5	5	15	4	43	10		
58-59	1				5	16	9	2	4	5		
60-61	2						4	0	4	2		
62-63							2	0		1		
64-65	1						1		5	1		
66-67							0			0		
68-69							0	0		0		
70-71								1	2	0		
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No Fish measured	668	831	416	214	205	194	2599	1067	287	6481	262	262
No samples	3	4	2	1	1	1	17	10	2	41	1	1
Sample weight (Kg)	366	400	163	101	144	142	1612	703	239	3972	102	102

TABLE 15. Yellowtail flounder length composition (0/00) in the trawl catches in Div. 3N in 2001.

Div. 3N						
Length (cm)	May	Jul	Oct	Nov	Dec	Total
14-15	4				20	1
16-17	4		0	0		0
18-19	4		1	0	7	1
20-21	13		1	0	7	1
22-23	22		1	0	40	2
24-25	39		2	2	53	4
26-27	66		10	5	80	10
28-29	114		35	12	107	25
30-31	170	20	81	69	127	76
32-33	179	111	93	176	167	139
34-35	166	278	155	260	147	211
36-37	109	177	171	231	80	199
38-39	61	207	169	142	93	153
40-41	22	96	120	52	40	81
42-43	9	61	71	27	7	46
44-45	9	35	39	15	13	25
46-47	4	10	36	7		19
48-49	4	5	10	1	13	5
50-51			2	1		1
52-53			1			0
54-55						
56-57			1			0
Total	1000	1000	1000	1000	1000	1000
No Fish measured	229	198	1039	1257	150	2873
No samples	1	1	8	10	1	21
Sample weight (Kg)	81	104	556	584	54	1412

Table 16. Cod length composition (0/00) in the trawl catches in Div. 3NO in 2001.

Div. 3N					Div. 3O			
Length (cm)	Apr	Jun	Oct	Total	Feb	Apr	Jun	Total
24-26		4		1				
27-29								
30-32	4	8		2				
33-35	9	12	1	4			19	7
36-38	54	41	2	15			56	20
39-41	121	61	21	38	13	123	4	52
42-44	148	98	33	57	18	150	27	66
45-47	206	122	115	124	36	142	55	75
48-50	166	171	178	175	102	138	127	117
51-53	108	176	283	244	160	128	173	149
54-56	112	114	221	188	191	101	214	160
57-59	31	65	85	76	89	77	159	90
60-62	13	37	40	37	58	43	104	56
63-65	18	24	5	11	36	10	59	28
66-68		16	5	7	36	3	37	24
69-71		16		4	22	1	23	15
72-74		4	2	2	22		14	14
75-77		4	4	4	49	1	4	28
78-80	4	4	1	2	40			23
81-83	4	12		3	22	5		14
84-86		4	1	2	27			15
87-89		4		1	49	3		29
90-92			1	1	18			10
93-95					9			5
96-98					4			3
Total	1000	1000	1000	1000	1000	1000	1000	1000
No Fish measured	223	245	466	934	225	528	220	973
No samples	1	1	2	4	1	2	1	4
Sample weight (Kg)	246	344	657	1291	581	621	379	1958

TABLE 17a. Skate length composition (0/00) in the trawl catches in Div. 3LM in 2001.

Length (cm)	Div. 3L				Div. 3M		
	Mar	Apr	May	Total	Feb.	Dec	Total
36-37	4			0			
38-39	16	5		3			
40-41	48	5		6			
42-43	84	11	13	20	32		18
44-45	105	53	19	37	63		36
46-47	113	122	52	77	63	176	118
48-49	97	154	97	112	171		95
50-51	80	144	130	128	32	59	45
52-53	77	133	162	146	70		38
54-55	61	80	143	118	63		36
56-57	48	69	84	77	63	59	63
58-59	36	48	71	62	133		73
60-61	28	37	71	58		59	27
62-63	8	43	52	45	44	118	78
64-65	16	27	45	38	63		36
66-67	27	16	13	15	44		24
68-69	8	21	6	11	13	59	35
70-71	8	16	19	17			
72-73	23			2	6	59	31
74-75	12	5		3	13		6
76-77	12	11	6	8	13		6
78-79	4		6	5	13		6
80-81	15			2	6		2
82-83	15			2	6		2
84-85			6	4	6		2
86-87	11			1		118	54
88-89						59	27
90-91							
92-93							
94-95						59	27
96-97							
98-99						59	27
100-101	11			1	6		2
102-103					13		6
104-105					6		2
106-107	11			1		59	27
108-109					6		2
110-111					6		2
112-113	11			1	6		2
114-115							
116-117					6		2
118-119					6		2
120-121							
122-123					13		6
124-125					6		2
126-127							
128-129							
130-131						59	27
132-133							
134-135	11			1			
136-137							
138-139							
140-141							
142-143							
144-145							
146-147							
148-149							
150-151							
152-153					6		2
Total	1000	1000	1000	1000	1000	1000	1000
Fish measured	233	188	154	575	59	17	76
N° of samples	2	1	1	4	2	1	3
Sample weight (Kg)	477	275	249	931	161	82	267

TABLE 17b. Skate length composition (0/00) in the trawl catches in Div. 3N in 2001.

Length (cm)	Div. 3N								
	Feb.	Apr	May	Jul	Aug	Oct	Nov	Dec	Total
24-25							2		1
26-27							1		0
28-29							1	2	1
30-31							1	2	1
32-33				7			2	7	3
34-35				11			8	7	7
36-37		2		18			11	23	12
38-39	11	5		39	5		21	35	22
40-41	31	16		49	54	17	31	42	38
42-43	53	37		51	54	96	35	36	46
44-45	71	61		74	128	107	50	51	68
46-47	76	105		68	39	79	50	82	59
48-49	104	134		78	59	85	60	70	67
50-51	107	116		66	128	90	60	64	75
52-53	104	102		63	113	79	65	55	72
54-55	91	75		59	54	147	67	70	70
56-57	49	59		72	113	113	68	67	70
58-59	58	51		75	143	96	52	48	64
60-61	57	43		53	34	22	57	50	52
62-63	42	41		39	20	6	52	35	44
64-65	31	28		68	25	11	43	44	39
66-67	26	28		42	5	11	44	35	36
68-69	22	22		32		11	36	25	23
70-71	29	34		17	5	6	33	28	26
72-73	11	17		7	5	6	30	35	22
74-75	4	4			10	11	40	27	11
76-77	4	5		7		6	25	17	9
78-79	4	8			5		23	10	2
80-81	4	3		3			16	13	9
82-83	4	2					8	13	5
84-85							5	2	3
86-87							2	5	2
88-89							1		1
90-91	4						1		0
146-147	2								0
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	288	599	465	203	177	2391	888	299	5310
N° of samples	3	3	2	1	1	16	6	2	34
Sample weight (Kg)	470	935	704	284	245	4714	1583	451	9318

TABLE 18a. Redfish (*Sebastes sp.*) length composition (0/00) in the trawl catches in Div. 3LM in 2001.

Length (cm)	Div. 3L							Div. 3M			
	Jan	Feb	Mar	Apr	May	Jun	Total	Feb	Mar	Dec	Total
18-19					2	2	1				
20-21		5	3			5	7	3			1
22-23		13	17	5	4	20	19	10	9	63	16
24-25		27	44	31	31	54	48	60	101		67
26-27		97	118	117	122	112	89	188	643	63	333
28-29		219	193	239	158	188	130	255	216	313	248
30-31		329	280	309	260	251	172	240	24	250	165
32-33		216	191	195	223	217	232	128	5	125	84
34-35		60	82	61	112	98	184	72	2	63	46
36-37		29	55	29	56	39	84	38	1	63	28
38-39		1	15	7	22	8	25	4		63	10
40-41		3		2	8	4	3				
42-43				4	1	1	3	2			1
44-45				1	1		3				
46-47											
48-49											
50-51											
52-53											
54-55			1				0				
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	444	444	507	1000	1327	585	4307	471	286	16	773
N° of samples	2	3	6	5	6	3	25	3	2	1	6
Sample weight (Kg)	181	186	208	440	549	269	1828	182	82	7	274

TABLE 18b. Redfish (*Sebastes sp.*) length composition (0/00) in the trawl catches in Div. 3NO in 2001.

Length (cm)	Div. 3N					Div. 3O		
	Feb	Apr	May	Jun	Total	Apr	Jun	Total
14-15						4		2
16-17				1	0	16		8
18-19				4	1	35		19
20-21			1	21	4	105		57
22-23			6	65	13	219		118
24-25			22	9	102	195		105
26-27	6	60	36	183	69	125		67
28-29	66	145	100	175	131	74	23	51
30-31	348	287	277	159	265	43	81	60
32-33	293	317	327	169	296	27	318	161
34-35	160	117	164	77	129	27	341	172
36-37	88	32	64	31	45	35	168	96
38-39	22	9	18	8	13	31	46	38
40-41	17	1	5		3	31	17	25
42-43		0		2	1	20	6	13
44-45		1		1	1	12		6
Total	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	181	868	220	663	1932	256	173	429
N° of samples	1	4	1	3	9	1	1	2
Sample weight (Kg)	90	385	105	245	860	81	98	186

TABLE 19. Percentage of the catches by stratum of depth for each Division and species.

3L	STRATA		
	0-200	201-600	601-4000
Specie			
GHL	0.6	2.8	96.6
RHG	0.4	1.4	98.3
RNG	0.2	1.8	98.0
HKR	0.3	1.1	98.6
SKA	0.1	1.2	98.8
Others	0.2	4.0	95.8
Total	0.5	2.7	96.8

3M	STRATA		
	0-200	201-600	601-4000
Specie			
GHL	0.3	3.4	96.3
PRA	0.2	99.6	0.2
RHG	0.2	0.7	99.1
RNG	0.2	3.2	96.6
SKA	19.0	2.7	78.3
Others	1.1	9.0	89.1
Total	1.0	18.6	80.3

3N	STRATA		
	0-200	201-600	601-4000
Specie			
SKA	82.7	2.3	15.0
GHL	0.8	4.4	94.8
PLA	77.1	5.9	17.1
YEL	91.2	4.0	4.8
RNG	0.6	3.5	95.9
Others	10.7	10.9	77.7
Total	53.3	4.4	42.2

3O	STRATA		
	0-200	201-600	601-4000
Specie			
RED	15.3	78.5	6.2
PLA	15.7	34.8	49.5
SKA	58.2	22.5	19.3
GHL	0.4	4.5	95.1
YEL	56.4	42.9	0.7
Others	21.5	33.8	43.1
Total	20.1	56.1	23.6

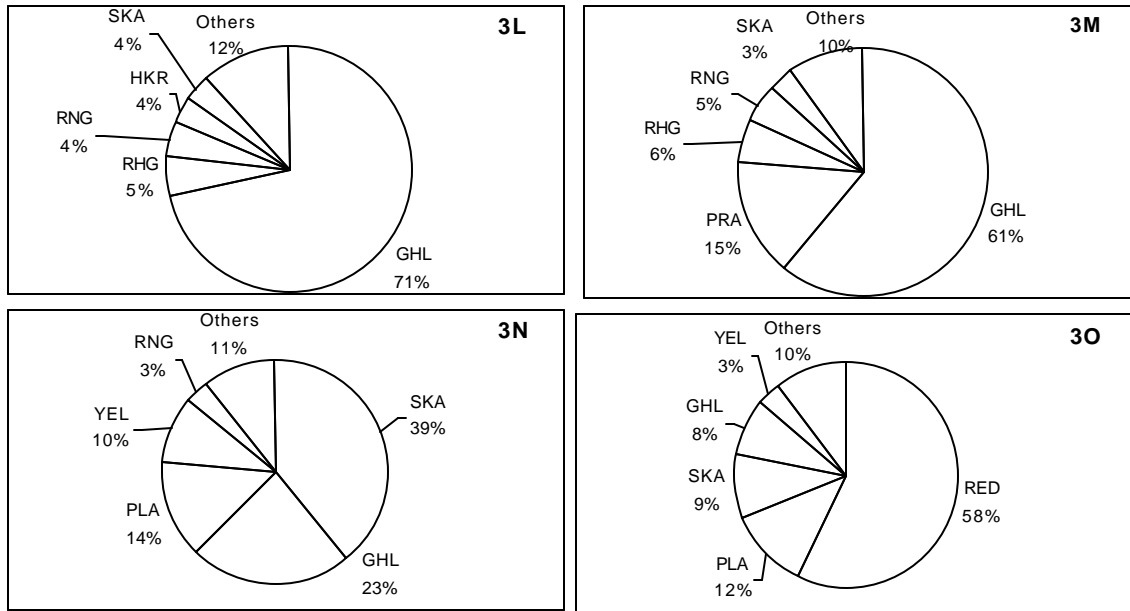


Fig. 1. Species composition (percentages over the total Division catch) in the Spanish trawl fishery in 2001. GHL = Greenland halibut; RHG and RNG = Grenadiers; HKR = *Gaidropsarus ensis*; SKA = Skate; PLA = American plaice; RED = Redfish; PRA = Prawn; YEL = Yellowtail flounder.